

Appl. No. 09/897,790  
Reply to Office Action of May 19, 2005  
Response dated August 18, 2005

AMENDMENTS TO THE SPECIFICATIONS

Please enter the following amendments to the paragraph beginning on page 4, line 1 of the present application:

In commonly-owned, copending patent application serial number 09/815,157, filed on March 22, 2001, entitled "Time Division Protocol for an Ad-Hoc, Peer-to-Peer Radio Network Having Coordinating Channel Access to Shared Parallel data Channels with Separate Reservation Channel", now U.S. Patent No. 6,817,165, there is disclosed a novel protocol for an ad-hoc, peer-to-peer radio network system having coordinating channel access to shared parallel data channels via a separate reservation channel. This network system having coordinating channel access to shared parallel data channels via a separate reservation channel is directed to a network system, such as the ad-hoc radio network system of the present application, where each node, or radio terminal, of the network is capable of serving as a node or hop of a routing path of a call from another, or to another radio terminal. In this system, communication between nodes or radio terminals is achieved using Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol with the addition of multiple parallel data channels serviced by one reservation channel. By dedicating a separate reservation channel for the multiple parallel data channels, collision-free access by all of the competing nodes or terminals of the service group of the network is greatly reduced. Communications between terminals or nodes is setup by information exchanged on the separate reservation channel, which information includes all of the call set-up information such as data channel desired to be used for transferring voice, video or data, the desired power level of at least initial transmission, messaging such as Request-to-Send (RTS), Clear-to-Send (CTS), Not-Clear-to-Send (NCLS), Acknowledgment (ACK) for indicating reception of the transmitted call, Non-Acknowledgment (NACK) for indicating improper reception of the call, etc. In this system, in order to further ensure fast, adequate and collision-

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free transmission and reception, besides a primary modem typically provided with the transceiver of each node or terminal, a secondary modem is also provided which is dedicated to the reservation channel. This system also provides for collision free transmission and reception between nodes or terminals by transmitting the reservation and data channels in time slots of time frames, with the information as to which time slot is to be used being included in the messaging transmitted by the reservation channel. Such a format not only provides collision-free transmission, but also allows for Quality-of-Service (QoS) for different types of Class-of-Service (CoS). Thus, not only may voice and video be transmitted, besides data, but voice and video transmission may be prioritized, so that when competing calls vie for a data channel, the delay-dependent voice or video transmissions will take precedence. This prioritization is accomplished by assigning prioritized calls for transmission in earlier time slots of a time frame. This network system ensures that every node or terminal of a service set of terminals has the most information regarding all of other terminals of that service set, so that the choice of data channel to be used, any required delay in transmitting the call, information on power level, and the like, are checked and updated by each terminal by a practically continuous monitoring of the reservation channel. The system of the invention utilizes protocol that provides collision-free channel access, which also emphasizes improving geographic reuse of the frequency spectrum. The ad-hoc, peer-to-peer radio system of this patent does not have, nor require, a base station, as conventional cellular systems, personal communications system (PCS), and the like, require; instead, each radio terminal forming part of the ad-hoc, peer-to-peer radio system may alternatively serve as a base station, in addition to being an ordinary link terminal of the radio system, whereby, if one such terminal serving as a base station should for some reason become inoperative, another terminal may take over and serve as the base station. In U.S. Patent No. 5,943,322 - Mayer, et al., which patent is incorporated by reference herein, the radio system thereof is for use in battlefield conditions, where personal voice communications is based on a time division duplex (TDD) technique in its own spectrum limitations. TDD systems, however, have not hitherto been

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deployed for voice systems.

Please enter the following amendments to the paragraph beginning on page 7, line 9 of the present application:

Reference is also had to copending, commonly-owned U.S. patent application serial number 09/815,164, filed on March 22, 2001, entitled "Prioritized-Routing for an Ad-Hoc, Peer-to-Peer, Mobile Radio Access System", now U.S. Patent No. 6,873,839, in which there is disclosed an example of routing table messaging which may be used in the present invention.

Please enter the following amendment to the paragraph beginning on page 8, line 13 of the present application:

The system of the present invention utilizes gateways and a gateway controller that provide the interlacing and transparency between the ad hoc terminals of the system of the present invention and those of a conventional or next-generation cellular network, or the PSTN or Internet. The components of the present invention are in addition to the routing and link layers of the ad-hoc transport disclosed in above-mentioned ~~application serial number 09/815,157 U.S.~~ Patent No. 6,817,165. The system of the present invention adds capability to the routing layer and call control layers of the underlying ad-hoc network in order to permit the function of interworking or interlacing to be completed.

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Please enter the following amendments to the paragraph beginning on page 12, line 4 of the present application:

Referring now to the drawings in greater detail, and in particular to Figs. 3 — 8, the system of the invention will be described for linking the ad-hoc radio access system 10 of the present invention to an external, cellular-switched network. The ad-hoc radio access system of the invention is made up of four main, specific components. As seen in Figs. 3A, 3B, and 4, these four components are: a plurality of mobile radio terminals 12 capable of receiving and transmitting at least one of voice and data communications, at least one router 14, at least one gateway node 16, and at least one cellular gateway controller 18, which gateway controller is interfaced to the Main Switching Center (MSC) 20 of a conventional or next-generation cellular network system. The capabilities defined within the system of the present invention are contained within the gateway nodes 16 and the gateway controller 18. The gateway controller 18 centralizes all of the interworking or interlacing protocols. Ad-hoc radio terminals 12 may communicate directly with each other as shown in Fig. 3A, or indirectly through other ad-hoc terminals 12 as seen in Fig. 3B. Routers and gateway nodes are also used, as described hereinbelow, for connecting ad-hoc terminals 12 serviced by one gateway to another ad-hoc terminal serviced by another gateway, as disclosed in above-mentioned ~~application serial number 09/815,157~~ U.S. Patent No. 6,807,165. In accordance with the present invention, the gateways also connect each ad-hoc radio terminal with the cellular switched network via the gateway nodes 16 and gateway controller 18, as seen in Fig. 4.

Please enter the following amendments to the paragraph beginning on page 13, line 5 of the present application:

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There are a number of ways that ad-hoc terminals can communicate with each other in this interworking and integration with the cellular network system. The terminals 10 can communicate directly with each other (Fig. 3A), or they can communicate indirectly through other terminals 12 and/or routers 14, and/or gateways 16 as described above. When they communicate through gateways 16, such communications minimizes the number of hops, or nodes, and through which the terminals may communicate with the switched cellular networks via the gateways 16 and gateway controller 18. The interworking between an ad-hoc radio terminal 12 with the switched cellular network uses H.323 protocol for Voice-over-IP (VoIP) telephony within the packet network, and IS-634 between a gateway 16 and the MSC of the cellular switched network. However, VoIP may be also be achieved using other protocols, such as MEGACO or SIP, while the gateway-to-MSC connection may use protocols such as GSM-A. VoIP call-setup messages are control messages that use TCP/IP, and look like any other on-demand data packet. The actual voice-payload is UDP packets that are quality-of-service (QoS)-flagged for low latency transport to a gateway, which QoS is disclosed in above-mentioned commonly-owned ~~application serial numbers: 09/815,164, and (1710.013)~~ U.S. Patent No. 6,873,839 and application serial number 09/882,820. In the preferred embodiment, H.323-specified G.729 vocoders ~~is~~ are utilized. In this case, the voice-packets are translated to G.711 for transmission over the telephony links. Each ad-hoc radio terminal has the capability of encoding in the G.711 mode for reducing the translation activity in the gateway.

Please enter the following amendments to the paragraph beginning on page 14, line 13 of the present application:

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Each gateway node 16 in the ad-hoc network system of the invention identifies itself as a special class of device, whereby each has the capability to access an external switched cellular network. This information is provided as part of the messaging on the control or reservation information channel within the ad-hoc network protocols, such that terminals 12 can readily identify~ gateways 16, as explained in above-mentioned ~~application serial number 09/815,157~~ U.S. Patent 6,807,165. An ad-hoc terminal 12 that wishes to be considered part of an external cellular network will first have to register with a gateway node 16 typically via other ad-hoc terminals serving as nodes or hops to the gateway, which is accomplished by exchanging routing tables, as set forth in above-mentioned ~~application serial numbers 09/815,164~~ U.S. Patent No. 6,877,839 (see Fig. 5). This is part of the initialization process of the terminal itself. The terminal 12 will identify itself to a respective chosen gateway 16 with a registration message. The gateway 16 will perform the following functions on receipt of a registration message, as shown in Fig. 6. It will validate the authenticity of the terminal, through the gateway controller 18, using GSM-A authentication and location-update procedures, and then provide a temporary address, within the gateway, for that terminal. This is deposited in a database of the gateway controller 18 for any further communication with the terminal. The gateway 16 will create a record of the terminal in its "Active Register" (AR), which is a database of all terminals 12 linked to that respective gateway 16. At some future point the terminal may move beyond the view of the current gateway and will need to register with a new gateway 18. The new gateway will go through the same sequence of events as the original gateway with the gateway controller 18, but will not require the GSM-A interaction with the MSC. The gateway controller 18 will, in addition to updating the temporary address, inform the original gateway to remove the terminal from its "Active Register" database.

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Please enter the following amendments to the paragraph beginning on page 15, line 12 of the present application:

Terminals 12 routinely exchange routing table information in order for them to be able to route to each other and through each other to distant terminals, in a manner disclosed in above-mentioned U.S. Patent ~~Application Serial No. 09/815,157~~ No. 6,807,165. These exchanges typically occur every couple of seconds. The routing tables include information about the quality of the link between two terminals, the distance between the terminals and indications of the congestion levels of each terminal, as explained in above-mentioned U.S. Patent No. 6,807,165 ~~application serial number (171008)~~. Gateways 16 identify themselves as a special class of terminal that can provide access to terminals and networks outside the current field of view.